CLAIMS

We claim:

1. An electrochemical sensor comprising:

a working electrode; and

an analyte-responsive sensing layer proximate the working electrode, the sensing layer exposed for contact with the analyte only at an edge of the sensor, wherein the sensor signal is limited, at least in part, by mass transport of analyte to the sensing layer;

wherein the sensor is configured and arranged for implantation into the body of a mammal for contact with body fluid of the mammal.

2. The electrochemical sensor of claim 1, wherein the edge is a peripheral edge of the sensor.

3. The electrochemical sensor of claim 1, wherein the edge is a distal edge of the sensor.

4. The electrochemical sensor of claim 1, wherein the edge is a side edge of the sensor.

5. The electrochemical sensor of claim 1, wherein the sensor defines a channel having an inner peripheral surface extending into the sensor, and wherein the edge at which the sensing layer is exposed is defined by at least a portion of the inner peripheral surface of the channel.

6. The electrochemical sensor of claim 1, wherein the sensor is planar.

7. The electrochemical sensor of claim 1, wherein the sensor is cylindrical.

8. The electrochemical sensor of claim 7, wherein the edge is a distal edge of the cylindrical sensor.

9. The electrochemical sensor of claim 1, wherein the sensor includes a base layer and a top layer, and the sensing layer is at least partially disposed between the base layer and the top layer.

10. The electrochemical sensor of claim 9, wherein the sensor further includes a spacer layer at least partially disposed between the base layer and the top layer, the spacer layer defining a channel having an inner peripheral surface extending into the spacer layer, and wherein the edge at which the sensing layer is exposed is defined by at least a portion of the inner peripheral surface of the channel.

11. The electrochemical sensor of claim 9, wherein the base layer and the top layer are impervious to the analyte.

12. The electrochemical sensor of claim 9, wherein the top layer is oxygen permeable.

13. The electrochemical sensor of claim 1, wherein the sensing layer is less than 100 μm thick.

14. The electrochemical sensor of claim 13, wherein the sensing layer is in the range of 1 to 10 μm thick.

15. The electrochemical sensor of claim 1, wherein the analyte is glucose.

16. The electrochemical sensor of claim 1, wherein the sensing layer comprises a redox polymer, an enzyme, and a cross-linker.

17. The electrochemical sensor of claim 1, wherein the sensor body is flexible.

18. The electrochemical sensor of claim 1, wherein the sensing layer is non-leachably disposed on the sensor.

19. An electrochemical sensor comprising:

a sensor body having an edge;

a working electrode disposed within the sensor body; and

an analyte-responsive sensing layer disposed within the sensor body and being exposed for contact with analyte only at the edge of the sensor, wherein the sensor signal is limited, at least in part, by mass transport of analyte to the sensing layer;

wherein the sensor is configured and arranged for implantation into the body of a mammal for contact with body fluid of the mammal.

20. The electrochemical sensor of claim 19, wherein the sensor body includes an outer portion that is impervious to analyte.

21. The electrochemical sensor of claim 20, wherein at least a part of the outer portion of the sensor body is oxygen permeable.

22. The electrochemical sensor of claim 19, wherein the edge is a peripheral edge of the sensor body.

23. The electrochemical sensor of claim 19, wherein the edge is a distal edge of the sensor body.

24. The electrochemical sensor of claim 19, wherein the edge is a side edge of the sensor body.

25. The electrochemical sensor of claim 19, wherein the sensor body defines a channel having an inner peripheral surface extending into the sensor body, and wherein the edge at which the sensing layer is exposed is defined by at least a portion of the inner peripheral surface of the channel.

26. The electrochemical sensor of claim 19, wherein the sensor body is planar.

27. The electrochemical sensor of claim 19, wherein the sensor body is cylindrical.

28. The electrochemical sensor of claim 19, wherein the sensor body includes a base layer and a top layer, and the sensing layer is at least partially disposed between the base layer and the top layer.

29. The electrochemical sensor of claim 28, wherein the sensor body further includes a spacer layer at least partially disposed between the base layer and the top layer, the spacer layer defining a channel having in inner peripheral surface extending into the spacer layer, and wherein the edge at which the sensing layer is exposed is defined by at least a portion of the inner peripheral surface of the channel.

30. The electrochemical sensor of claim 19, wherein the exposed portion of the sensing layer is less than 100 μm thick.

31. The electrochemical sensor of claim 30, wherein the exposed portion of the sensing layer is in the range of 1 to 10 μm thick.

32. An electrochemical sensor comprising:

a working electrode; and

an analyte-responsive serving layer proximate the working electrode,

wherein the sensor defines a channel having therein an inner peripheral surface extending into the sensor, and wherein the sensing layer is exposed for contact with analyte only at a portion of the inner peripheral surface of the channel.

33. A method of determining the concentration of an analyte in a body fluid of a mammal, the method comprising:

providing an electrochemical sensor comprising a working electrode, and an analyte-responsive sensing layer proximate the working electrode, the sensing layer exposed for contact with analyte only at an edge of the sensor, wherein the sensor signal is limited, at least in part, by mass transport of analyte to the sensing layer;

implanting at least a portion of the sensor into the body of the mammal such that the edge of the sensor contacts body fluid of the mammal; and

measuring the concentration of the analyte in body fluid of the mammal using the sensor.

34. The method of claim 33, wherein the edge is a peripheral edge of the sensor.

35. The method of claim 33, wherein the edge is a distal edge of the sensor.

36. The method of claim 33, wherein the edge is a side edge of the sensor.

37. The method of claim 33, wherein the sensor defines a channel having an inner peripheral surface extending into the sensor, and wherein the edge at which the sensing layer is exposed is defined by at least a portion of the inner peripheral surface of the channel.

38. The method of claim 33, wherein the sensor includes a base layer and a top layer, and the sensing layer is at least partially disposed between the base layer and the top layer.

39. The method of claim 38, wherein the sensor further includes a spacer layer at least partially disposed between the base layer and the top layer, the spacer layer defining a channel having in inner peripheral surface extending into the spacer layer, and wherein the edge at which the sensing layer is exposed is defined by at least a portion of the inner peripheral surface of the channel.

40. The method of claim 33, wherein the sensor is subcutaneously implanted.

41. The method of claim 37, wherein the sensor is used to measure an analyte in subcutaneous fluid.